

by the Office to consider the patentability of Applicant's claims may not be attributed to Applicant.

Additionally, the Final Rejection states that the meaning of the claim language "to selectively and epitaxially grow a single crystalline film on the exposed surface of the substrate that laterally overgrows the amorphous film" is not immediately clear (see Final Rejection section 3, lines 8-10). The Applicant respectfully submits that the grammar of the quoted phrase is correct and that each word in the quoted phrase is used in accordance with its ordinary meaning as defined in the American Heritage College Dictionary, Fourth Edition, and contextually comports with the description and illustration of the claimed subject matter provided in the specification and drawings. Thus, when read in light of the specification, as required when evaluating the patentability of claims, the meaning of the Applicant's claims would be readily understood by one of ordinary skill in the art.

Claims 1-6, 11-18, and 20-23 stand rejected, under 35 USC §103(a), as being unpatentable over Tanaka et al. (US 6,377,596) in view of Tokunaga et al. (US 5,425,808) and Nakamura et al. (JP 01-234389A). The Applicant respectfully traverses these rejections.

Claim 1 recites directing an atomic, a molecular, or a chemical beam toward an exposed surface of a single crystalline substrate to selectively and epitaxially grow a single crystalline film on the exposed surface that laterally overgrows an amorphous film formed on the substrate. The Office Action, dated June 30, 2005, and the Final Rejection propose that Tokunaga provides the motivation or suggestion to modify Tanaka's teachings to achieve the above-mentioned feature of claim 1.

More specifically, the Office Action of June 30, 2005 proposes that a skilled artisan would be motivated to substitute applying molecular beam epitaxy (MBE) for Tanaka's disclosure of applying chemical vapor deposition (CVD) to epitaxial lateral overgrowth (ELO) based on Tokunaga's putative teaching of the equivalency of CVD and MBE for epitaxial growth of a film (see Office Action section 3, second, fourth, and fifth paragraphs). The Final Rejection proposes that Tokunaga suggests the equivalency of MBE and CVD for epitaxial growth in column 7, lines 15-25, and that the examiner takes Tokunaga's suggestion at face value (see Final Rejection section 4, lines 1-4).

Although, Tokunaga discloses in the cited text that selective growth of a III-V group compound film can be performed by use of either CVD or MBE, Tokunaga does not suggest the equivalency of CVD and MBE for such growth. Neither the Final

Rejection nor the Office Action of June 30, 2005 identify any finding of fact that would support the Office's conclusion of equivalency between CVD and MBE for the selective growth of a III-V group compound film. Thus, the only face-value suggestion that may be reasonably attributed to Tokunaga's disclosure is that both CVD and MBE may be used for selective epitaxial film growth.

Applicant identified in the Response submitted November 30, 2005 multiple findings of fact that support Applicant's argument that CVD and MBE are not equivalent for ELO and that a skilled artisan would not consider them so. The Final Rejection's failure to dispute these findings of fact or to provide countervailing facts provides tacit acknowledgment of the unassailability of Applicant's argument. Thus, the Final Rejection's conclusion that Applicant's previous argument was not convincing (see Final Rejection section 4, line 1) is contrary to the evidence of record.

Specifically, Applicant's Response submitted November 30, 2005 presented findings of fact that Applicant was the first person to publicly disclose applying MBE to ELO (see Response page 3, last paragraph, and page 4, first two paragraphs). During the 15-year period between the first apparent public disclosure of applying CVD to ELO and the first apparent

disclosure of applying MBE to ELO, made by Applicant in the present application, the use of both CVD and MBE for epitaxial film growth was known to skilled artisans (see page 3, last paragraph, and page 4, first paragraph). Thus, as stated in the Response submitted November 30, 2005, the 15-year period between the first apparent public disclosure of applying CVD to ELO and the first apparent disclosure of applying MBE to ELO, during which both CVD and MBE were known by skilled artisans to be useful for epitaxial growth, provides strong evidence that those of ordinary skill in the art did not recognize any equivalency between the application of CVD and MBE to ELO (see page 4, first paragraph). The Final Rejection's failure to dispute this evidence provides implicit acknowledgment that it is incontrovertible.

Moreover, Applicant previously submitted findings of fact that applying MBE to ELO, in accordance with the method defined by claim 1, provides the ability grow a single crystalline film on a single crystalline substrate having a dislocation density of no more than  $10^4/\text{cm}^2$  and particularly no more than  $10^2/\text{cm}^2$  (see page 2, second paragraph, and specification page 10, last paragraph). Although Tanaka discloses that a single crystalline film may be grown via CVD based ELO on a single crystalline substrate, the dislocation density achieved by such CVD based ELO

is far worse than that achieved through MBE based ELO.

Specifically, Tanaka discloses that the dislocation density achieved by growing a GaN single crystalline film via CVD based ELO on a single crystalline substrate of sapphire is in the range of  $10^4/\text{cm}^2$  to  $10^5/\text{cm}^2$  (see Tanaka col. 15, lines 44-48, and col. 15, lines 27-41). Since dislocations degrade the quality of the developed film, MBE based ELO provides a far superior film to that achievable through CVD based ELO.

More simply, a dislocation density of less than  $10^2/\text{cm}^2$ , as may be achieved with the MBE based ELO recited in claim 1, is not equivalent to a dislocation density of between  $10^4/\text{cm}^2$  to  $10^5/\text{cm}^2$ , as may be achieved through Tanaka's disclosed CVD based ELO. The applied references do not provide evidence that a dislocation density better than  $10^4/\text{cm}^2$  may be achieved through CVD based ELO, and the Final Rejection's failure to dispute Applicant's submitted findings of fact provides implicit acknowledgment of their unassailability.

Furthermore, Applicant submitted findings of fact in the Response that MBE based ELO provided significant advantages over CVD based ELO. Specifically, Applicant submitted evidence that MBE based ELO provides the ability to achieve a high ratio of ELO width to ELO thickness and that this ratio may be determined by the applied beam's angle of incidence with respect to the

substrate on which the ELO film is grown (see Response page 2, second paragraph). Applicant further submitted evidence that the thickness of the ELO film could be controlled within the order of an atomic layer using the method defined by claim 1. The Final Rejection's failure to dispute these findings of fact provides tacit acknowledgment of their unassailability.

Instead of controverting Applicant's submitted findings of fact concerning the ratio of ELO thickness to width and the controllability of ELO thickness, the Final Rejection states that these findings of fact are not persuasive because the ratio and thickness features are not recited in claim 1 (see Final Rejection section 3, lines 1-7). Applicant respectfully submits that the Office has misconstrued the previously submitted remarks.

Applicant did not argue that claim 1 recited a specific ratio of ELO width to thickness or a specific degree of controllability for ELO thickness that was not known in the prior art. Instead, Applicant argued that the combined teachings of the applied references do not provide a motivation or suggestion to modify the method disclosed by Tanaka to achieve the subject matter defined by claim 1.

As discussed above, neither the Office Action of June 30, 2005 nor the Final Rejection identify a single finding of fact

that could support the conclusions therein that CVD and MBE are equivalent for the purpose of generating epitaxial growth, or more importantly the epitaxial lateral overgrowth recited in claim 1. Moreover, the Final Rejection does not dispute any finding of fact identified within the Response that no such equivalency exists. Since the only basis cited by the Office Action or the Final Rejection for combining the teachings of Tanaka and Tokunaga is the alleged equivalency of CVD and MBE for epitaxial growth and the evidentiary record fails to identify a single finding of fact that could support the Office's conclusion of equivalency, it necessarily follows that the applied references do not provide a motivation or suggestion to modify the teachings of Tanaka with those of Tokunaga in the manner proposed by the Office.

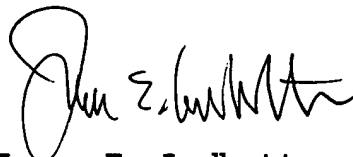
Accordingly, Applicant submits that the applied references, alone or in combination, do not render obvious the subject matter defined by claim 1. Therefore, allowance of claim 1 and all claims dependent therefrom is warranted.

In view of the above, it is submitted that this application is in condition for allowance and a notice to that effect is respectfully solicited.

If any issues remain which may best be resolved through a telephone communication, the Examiner is requested to telephone

the undersigned at the local Washington, D.C. telephone number listed below.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "James E. Ledbetter". The signature is stylized with a large initial "J" and a cursive "E".

James E. Ledbetter  
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